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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/615,294 07/13/00 KNOWLES

S A-68944/ESW

EXAMINER

QM12/0914

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ART UNIT

PAPER NUMBER

3729

DATE MAILED:

09/14/01

**Please find below and/or attached an Office communication concerning this application or proceeding.**

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## Office Action Summary

Application No.

09/615,294

Applicant(s)

KNOWLES ET AL.

Examiner

Dexter Tugbang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 June 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) 1-3 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 4-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 July 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                  | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input checked="" type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)              | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>2</u> . | 6) <input type="checkbox"/> Other:  |

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election of the invention of Group II, Claims 4-13, in Paper No. 3 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).
2. Claims 1-3 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 4.

### *Drawings*

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the use a laser beam to pass through a tine of transparent material to remove one side of the balancing masses must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

### *Specification*

4. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: A Method of Manufacturing a Tuning Fork with Reduced Quadrature Error and Symmetrical Mass Balancing.

*Claim Rejections - 35 USC § 112*

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 7-10 and 12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In Claim 7, the phrase “the rate sensor output” (lines 5-6) lacks positive antecedent basis. Also, it is unclear what the term “mass” (line 6) is referring to. Apparently, the term “mass” is referring to the mass of the enlarged area between the two tines and the examiner recommends amending the recitation (at line 6) to read as —...maintain a balance in mass of the enlarged area between the two tines--.

In each of dependent Claims 8 and 9, the term “mass” is misleading and confusing because it is unclear what material the term “mass” is referring to and it also contradicts the previously recited term of “mass” in Claim 7. In each of Claims 8 and 9, the term “mass” implies that each of the tine material themselves is what is being removed, not the material of the balancing masses. Also in Claim 9, the 2<sup>nd</sup> occurrence of the phrase “a laser beam” (line 3) is ambiguous because it is unclear whether this latter recitation is intended to refer to the previous recitation of “a laser beam” (line 2). How many laser beam(s) are there?

In Claim 10, the phrase “the same sides” (line 2) lacks positive antecedent basis. Apparently, the phrase is referring to the same sides of the enlarged area of the tines and the

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examiner recommends amending the recitation (at lines 2-3) to read as --...the same sides of the enlarged area of the tines...--.

In Claim 12, the phrase “the same side” (line 2) lacks positive antecedent basis. Apparently, the phrase is referring to the same front or rear surfaces of the drive tines and the examiner recommends amending the recitation to read as --...the same [side] front or rear surfaces of the drive tines...--.

### *Claim Rejections - 35 USC § 102*

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 4-6 are rejected under 35 U.S.C. 102(b) as being anticipated by Macy 5,522,249.

Macy discloses a method of manufacturing a tuning fork comprising: forming a pair of elongated tines 26, 27 disposed symmetrically about an axis (shown in Fig. 4), each having a front surface (side surface 43) and a rear surface (side surface 44); and applying balancing masses of multiple mass elements (pickup electrodes 106, 107, 121, 122, 116, 117, 131, 132) on the front and rear surfaces of each tine (shown in Figs. 7-9).

Macy teaches that the multiple balancing masses (pickup electrodes) are patterned by laser trimming or removing of mass material from the balancing masses to reduce quadrature error and strain and maintain a balance in mass between each tine due to the flexing and torsion.

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Macy also teaches that laser trimming the balancing masses effects the pickup and drive mode frequencies of the tuning fork (all of which is discussed at col. 7, line 34 to col. 8, line 32).

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 7, 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Macy in view of Fujiwara et al 4,468,582.

Macy, as relied upon above, teaches the claimed manufacturing method for a tuning fork. Macy further teaches that each tine 26, 27 has an enlarged area (cross sectional area hatched in Fig. 9) with free ends, and that this enlarged area is between balancing masses (pickup electrodes 106, 107, 121, 122, 116, 117, 131, 132).

Macy does not teach that the balancing masses on opposite sides of the enlarged area are laterally offset.

Fujiwara shows an enlarged area mass of a single oscillating tine (piezoelectric chip plate 305) with balancing masses (electrodes 311, 312) on opposite sides of the enlarged area and laterally offset from one another (see Fig. 16). Fujiwara also laser trims these laterally offset balancing masses (electrodes) to achieve an adjustable range of resonant frequency for the oscillating tine (see col. 8, lines 19-39).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified each of the tines of Macy by forming the balancing masses with a lateral offset relationship on opposite sides of the enlarged area, as taught by Fujiwara, to positively achieve an adjustable range of resonant frequency for each oscillating tine.

Regarding Claims 8 and 10, it would have been an obvious matter of design choice to choose any desired *amount of mass material* to be remove from the balancing masses on either the same side, or opposite sides, of the tines to achieve a reduction in quadrature error. One of ordinary skill in the art in the manufacturing of tuning forks would be able to remove balancing mass materials in a substantially equal amount from either the same side, or opposite sides, of each tine to at least solve the problems associated with reducing quadrature error. Furthermore, it appears that the invention would perform equally well with the amount of balancing mass material being removed as taught by Macy or Fujiwara et al.

11. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Macy in view of Fujiwara et al, as applied to claim 7 above, and further in view of Praschek et al 5,296,674.

Macy, as modified by Fujiwara, teaches the claimed manufacturing method as previously discussed. The modified Macy method does not teach that the tines are formed from a transparent material where the balancing mass material is removed from one side of one of the tines with a laser beam passing through the tine.

Praschek teaches an electrode patterning process in which a laser beam passes through a transparent thin film substrate to trim or pattern an electrode material (shown in Fig. 2). The benefits of such a patterning process prevent electrical shorts from occurring when the conductive materials are removed or ablated (see col. 3, lines 10-19).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Macy method by forming the tines with a transparent material thereby including an electrode patterning process, as taught by Praschek, to prevent electrical shorts from occurring when the conductive/electrode materials are removed or ablated from the tines during laser trimming.

12. Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Macy et al, 4,930,351, referred to hereinafter as Macy'351 in view of Macy 5,542,249, referred to hereinafter as Macy'249.

Macy'351 (noting Figs. 1, 4 and 5) discloses a method of manufacturing a tuning fork comprising: forming a pair of drive tines 110, 112 having front and rear surfaces; forming a pair of pickup tines 160, 162 having front and rear surfaces; providing balancing masses (electrodes 200, 202, 204, 206, 210, 212, 214, 216) on the front and rear surfaces of the drive tines 110, 112 and providing balancing masses (electrodes 220, 222, 224, 226, 230, 232, 234, 236) on the front and rear surfaces of the pickup tines 160, 162; and adjusting the pairs of drive and pickup tines electronically (i.e. an electrical means) with a quadrature generator 594 to reduce quadrature offset error (see col. 20, lines 9+).

Macy'351 does not teach trimming the balancing masses on opposite sides, or on the same sides, of the drive tines to reduce quadrature offset error.

Macy'249 teaches the general concept of laser trimming balancing masses of electrode material located on any of the sides of each tine as a mechanical means to reduce quadrature offset error (see col. 7, line 34+). The benefit of this concept provides a more precise electrical null or reduction in quadrature offset error, as compared to the electrical means of reduction in



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quadrature offset error. The laser trimming of Macy'249 does not affect the mass balance of the drive tines because the material being trimmed is the balancing masses (electrodes) themselves and not the tine material.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Macy'351 by laser trimming the balancing masses on any of the sides of each tine, as taught by Macy'249, to mechanically and more precisely provide a reduction in quadrature offset error of the tuning fork.

### *Conclusion*

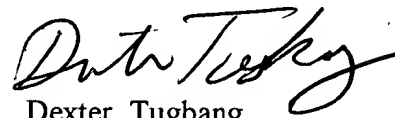
13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dexter Tugbang whose telephone number is 703-308-7599. The examiner can normally be reached on Monday - Friday 7:30 am - 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lee Young can be reached on 703-308-2572. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-3590 for regular communications and 703-305-3588 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0858.

A handwritten signature in black ink, appearing to read "Dexter Tugbang". The signature is fluid and cursive, with the first name "Dexter" and last name "Tugbang" clearly distinguishable.

Dexter Tugbang  
Examiner  
Art Unit 3729

September 7, 2001